

A strategy towards bioprotection of tropical crops : Experiences and perspectives with ISR on pineapple and banana in Martinique

A.SOLER
PA.MARIE-ALPHONSINE



N.PORTAL-GONZALEZ
R.GONZALEZ



A.REPELLIN



S.DECLERCK



P.QUENEHERVE



Introduction

Intensive monoculture resulted in poor biodiversity and loss of natural biological regulations. Our strategy to control soil borne parasites in tropical crops is to develop environmentally friendly agrosystems where induced systemic resistances (ISR) may better express their potential. Our research aims at validating 4 main hypotheses to optimize ISR efficiency in the field.

H1) Reduction of pathogens inocula using non host rotation crops.

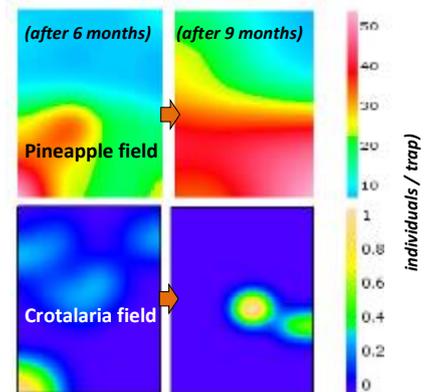
Mat.Method: a) Host status for Rotation crops germplasm tested in greenhouse after inoculation of monospecific nematode or symphyliid populations. b) Dynamic of symphyliid populations monitoring plots (40x20m), in conditions of production, bait & trap system (Soler et al 2011).

a) Screening of rotation crops germplasm against nematodes and symphyliids (Greenhouse & field plots) (CIRAD/IRD)



Crotalaria spp reduce inocula of pathogens. Other functional traits : biomass production, nitrogen fixation, weed control and increase of mycorrhization potential of soil (UC Louvain).

b) Spatial and temporal dynamics of symphyliid populations in field experiments.

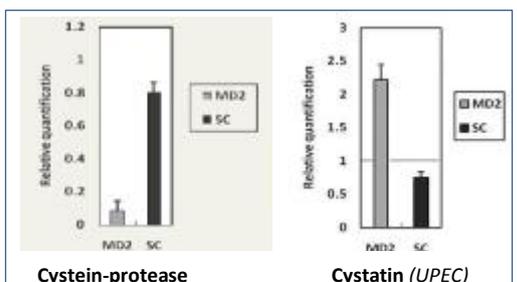


(Maps density) (CIRAD)

H2) Selection of varieties able to develop induced systemic resistances AND to adapt their metabolism to environmental changes.

Mat.Method: a) Methyljasm. ($10^{-4}M$) applied on root system of 2 pineapple varieties, followed 1 week later by inoculation with 5.10^3 nematodes from monospecific rearing (*R. reniformis*). b) RTqPCR analyses of genes expression after cold stress.

Varieties	Pineapple	
	MD2	Smooth cayenne
Tolerance level without eliciting treatment	- Tolerant - Very good host	- Sensitive - Good host
Difference with unprimed plants (CIRAD/IRD)	-70%	0%
	Decrease of population of <i>R reniformis</i>	



- Two pineapple varieties showed a differential induction of ISR against nematodes (idem bananas).
- Two genes markers (cystein protease & cystatin) of plant adaptability to abiotic changes were detected in the only variety (MD-2) able to develop ISR.

H3) Combined crops tolerance to abiotic stresses AND to pathogens at the same time

ISR may be another aspect of a global capacity of plant metabolism to adapt to stresses. So, the level of stress induced by abiotic constraints may interfere with the ability of plants to develop defenses against pathogens (under investigation).

H4) Induction of efficient ISR against pathogens through local endophytes

Local diazotrophic bacteria (endophytes) have been isolated from pineapple & bananas roots and a Strains library created (*Unica, Cuba*). (Identification & test for ISR efficiency , under investigation).



Conclusion

Environmentally friendly agrosystems and selected varieties tolerant to abiotic stresses may be a pre-requisite for efficient and consistent induced systemic resistances in some tropical crops. Local endophytes may be the basis for a mass production of bioprotected planting material.